EVALUATION OF THE AERCO 2068 DISC INTERFACE

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Aerco has been shipping its 2068 disc drive interfaces since June, 1985, although quantities were originally limited, and it took some time to fill the large backlog. The wait was well worth while, however, for this is an excellent system that turns the 2068 into a powerful and convenient computer. The interface can be ordered to accomidate up to four discs drives which are: (1) single or double sided, (2) single, double or quad density and (3) any size from 3 inch to 8 inch. This interface information is burned into an EPROM before shipment to the user. Mixed types of drives can be used by ordering a custom EPROM. You will not be able to change to different types of disc drives through software, but you could order a different EPROM unit at a nominal cost, should you change drives. This slight lack of versatility is outweighed by the fact that the disc drive programming is all contained within the EPROM, which replaces the functioning of the Timex ROM. Most programs for the 2068 work without any major modification because the Aerco drive takes up no space in the resident 2068 RAM.

All of the Timex operations are retained. Most of the keywords for disc operation are obtained from the top row of keys on the Timex keyboard. Aerco serial and parallel interfaces can easily be accomidated. The Tasman parallel printer drive works without modification.

Also included with the Aerco unit is 64K of extra RAM, which is located in the "dock" (or cartridge) bank of addresses. This can be enabled in 8K chunks by appropriate commands. Of course, only 64K can be addressed by the computer at any given time, but a person can switch between memory banks for additional memory (See SyncWare News, Jan-Feb, 1985). A 256 K dock memory update now available for $50, for which you send your unit back to Aerco, will be discussed in a future article. The Aerco interface allows the reading of a program, or part of a program, directly from a diskette onto the dock bank, for which the Timex rules for dock operation apply. (See sect. 5.1 of the Timex 2068 Technical manual.) Such programs can perform just like a plug-in cartridge. However, be warned that any use of the dock memory requires the solving of complex programming problems. Most of us will find it best to wait until the additional software to do this is made available.

A diskette to switch to CP/M 2.2 operation is available for $25. This provides access to a great

number of programs written for other computers. The CP/M system runs on the added dock memory.

Aerco has frequently updated the EPROM and the "boot" diskette which comes with the unit. (This diskette has instructions, but it is not necessary to run the system.) The EPROM supplied with early units had several important limitations which have been solved in the latest EPROM (#FD68.87). The earlier instruction manual was skimpy, but the latest one is much more complete, and easy to read. It includes complete schematics. The latest "boot" diskette includes an excellent visual display demonstration program, which can only be fully appreciated with an RGB monitor. Several useful utilities are supplied on the disc, including "header", which you will probably use frequently. Aerco expects that additional software on diskettes will be released soon.

Not the least of the features of the system is that as I write this, Aerco is shipping full update kits (EPROM, diskette and instruction book) to people who previously purchased an interface!

RGB MONITOR

The Aerco interface board plugs into the rear of the Timex 2068, and has an extension pinout for other periferals. There are two pinouts to the right of the board, as seen from the front of the 2068. The top one takes a standard printer driver cable. The bottom pinout is 20 pin, with 0.1 inch separation, and provides an RGB monitor connection. One of the advantages of the Timex 2068 is this RGB facility, and if you aren't making use of it, you don't know what a great display is possible from this computer. The Aerco circuit is essentially the same as suggested on page 6 of the Timex 2068 Technical Manual. A person could also construct this circuitry himself, or purchase the interface alone from Aerco for $45 + $3 shipping. John Oliger sells an RGB monitor interface with different circuitry (requiring a small computer modification) as part of his expansion board for the 2068. Both the Oliger and Aerco RGB interfaces work extremely well. The superior display is well worth the investment in one of these interfaces and an RGB monitor.

You will need a cable for your RGB monitor. The pinout for the Aerco RGB on the disc interface is given below. The even pins are on the front (non-component) side of the board, numbered from the bottom upward. The odd pins are on the back (component) side of the board and are all grounded. You can get the connectors from an electronics supply house and make your own cable, or use one supplied by Aerco for $30 (specify the monitor).

20, 18	No connection
16	TTL video (not needed for RGB)
14	Blue
12	Green
10	Vertical Sync
8	Red
6	Horizontal Sync
4	No connection
2	Composite Video (not needed for RGB)
odd #	All grounded

One problem can emerge in the use of the Aerco RGB connection. If you have made all the connections properly, but you do not get correct operation on the monitor (for example, the picture won't stand still), then you probably have a monitor that requires positive sync pulses. Mine is a Tatung, and needs this. I understand that some other IBM PC monitors also have positive sync. The Aerco unit is designed for a negative sync pulse. To remedy this, you need to mount an inverter along with the 74LS367 chip (lower left, component side of the board). The circuit for this is shown below. For most RGB monitors, you could probably tie the vertical and horizontal sync together. I mounted all of this on a 16 pin header, using 14 and 16 pin DIP sockets. This replaces the 74LS367. It's not complicated, but a little tight. Aerco may have a built-up inverting adapter available soon for positive sync monitors. Another solution would be to install an inverter and a positive-negative switch in your monitor, <u>if</u> you know what you're doing. John Oliger's RGB interface has outputs for either positive or negative sync.

(EDITOR; Put insert A, the diagram, here)

<u>DISC COMMANDS</u>

For the Aerco Interface, The Command FORMAT (key 0) is used to format a disc, CAT (key 9) to load a program from disc, MOVE (key 6) to save a program on disc, and ERASE (key 7) to erase a program. Several extensions are used after each program name to identify the type of program, and initiate certain operations. These include:

- .ARO - runs in the dock, starting at 8000H.
- .BAS - basic program.
- .BIN - binary data (the equivalent of CODE for tapes),
- .BUT - boot program (CP/M only)
- .SCR - video screen display (like SCREEN$ for tapes: 6912 bits at location 16384)

These are easier to use than describe. Typical commands would be

```
        MOVE "a:Penetrator.BAS",15     <ENTER>
or      MOVE "Pens.BIN",40000,6912     <ENTER>
or      CAT "b:Vu3d.BAS",              <ENTER>.
```

The a: and b: near the beginning of the first and third commands cause the operations to be done on

the A and B disc drive respectively. If no disc drive letter is given in a command, the system will do the operation on the last-used disk drive, if possible. The "15" at the end of the first command is the starting line number for the BASIC program when it is reloaded into the computer. The two numbers at the end of the second command are the memory location and length of the binary program. Whether you use capital or small letters in the commands does not matter, except that in a MOVE command this determines how the directory listing for that program will look. Should you enter an improper command, like trying to read from a disc drive with no diskette, or trying to load a non-existent program, the error messages will be simple and easily understood.

Three extensions are not available now, but will be implemented later. These are

.LRO - loads a program into the dock starting at address 0,
.CHR - a character array,
.DAT - a numeric array.

Let's hope that these will be available soon.

There are a few other handy commands and operations. (1) MOVE "b:=a:", copies the entire record of diskette A to diskette B (without affecting the record on A). Careful, this also totally erases any previous data on diskette B, without warning. The copy takes about 2 minutes. (2) CAT "a:", will give a directory for diskette A. (3) OUT 244,1 will reinitialize the disc drive system without losing your program (whenever I've tried it). At present, disc operation can occassionally be lost due to using a BREAK command, or certain other operations. Reinitialization is therefore handy. (4) If you would like to load a BASIC program into the memory, but not auto-run it, type CAT "Name.bas",10000 which gives a starting line above any line likely to be in the program, causing the program to load but not execute. (5) Using the name "Load.BAS" for a program will cause that program to automatically load on startup, if the diskette containing that program is in disc drive A.

There is no MERGE command from disc. You will have to save the program to be merged on tape, and merge it from there. Aerco may incorporate a MERGE from disc later.

TRANSFERRING PROGRAMS TO DISC

Most owners of a disc interface system will want to transfer software they have already purchased in tape form onto a disc. Making your own copies of software you purchased is legal, but copying for sales or gifts to others is not.

To save BASIC programs on disc, you will need to know the starting line for the program. For binary programs you will need the starting address in memory and the length of the program. This information can be obtained by a program which reads the tape headers. One was listed the September, 1984 issue of Syntax. Another, written by Dan Pinko and called "header", has been included on the latest Aerco diskette. Run the tape and use one of these programs to obtain the names of program segments and the data mentioned above. Copy that information, press BREAK, enter OUT 244,1 and rewind the tape. Then take the following steps.

1. Delete any BASIC lines from the memory. You can use DELETE 1, to do this.

2. Obtain the beginning BASIC program from the tape with MERGE "name" (a name is optional). After the "0 O.K., 0:1" message, immediately stop the tape. Then LIST the program. Delete any messages about running or stopping the tape. Replace any LOAD "" commands with CAT "Name.BAS", and any LOAD "" CODE commands with CAT "Name.bin", and LOAD "" SCREEN$ commands with CAT "Name.SCR",. If the original LOAD "" CODE commands also had an address for loading different than the one you obtained with the header program, you must include that address in your CAT command. Thus, A tape command LOAD "NameA" CODE 32768 should be changed to the disc command CAT "NameB.BIN",32768. The names for disc loading can be different from those used on the tape. Be sure to use names not likely to be used on the same diskette for other programs. By the way, you can use the same root name once with each of the three different extensions, such as Ski.BAS, Ski.BIN and Ski.SCR.

3. Save the modified beginning program on a diskette with the command MOVE "g:Name1.bas",x where the number x is the starting address for the program, obtained with the header program, and g is one of the disc drives, A, B, C, or D.

4. Load the next program segment from the tape. Use LOAD""CODE for a binary, LOAD""SCREEN$ for a screen program, and then start the tape. These programs can usually be saved on disc without modification, using MOVE "Name.bin",y,z or MOVE "Name.scr",. When saving a Binary program, use the beginning address number, y, and program length, z, previously found with the header program. (This tells the routine where to find the program.) Be sure to use the same names for these segments as used in step number 2.

If the next program segment is BASIC rather than binary, use the same procedures as in steps 1, 2 and 3. Then save the program using MOVE "Name2.bas",x (with a name different from the earlier BASIC segments for this program).

When saving a screen display, you are likely to lose the bottom two lines of the display because these lines are used for current computer control information. This can be avoided if you load the screen display into the computer and then save it on disc without ever giving control back to the keyboard. To do that, RUN The following program:

```
10 LOAD "NAME1" SCREEN$
20 OUT 244,1
30 MOVE "NAME2.SCR",
40 STOP
```

Start the tape as soon as you RUN the program. The OUT 244,1 is included just in case disc operation has been lost along the way.

Continue until all program segments are saved on the same diskette. You should now be able to run your program by typing CAT "Name1.bas",.

Some software companies use the same logo at the beginning of each program. QuickSilva is a good example. In such a case, you need only save the logo once on a diskette, as a screen record, and call up the same screen record for the several different programs on that diskette. Also, when a company has directions on one side of a tape and the main program on the other side, you should be able to devise a means of giving the user a choice of seeing the instructions at the beginning of the main program, and then load those instructions from the diskette only if he answers "yes".

Occasionally a BASIC program can't be listed, and therefore step 1 can't be followed. Sometimes this is because the computer has been set with ink and paper of the same color, so that the listing is invisible. Try entering a different ink color to check if you then can see the list. Another problem that is rather uncommon results in the LISTing of only one or two lines, followed by an error message. In that case, the programmer has probably included a routine in those one or two lines to prevent further listing (for security reasons). Write down those lines to pick up any commands essential for the program, and then start DELETing them, one by one, to see if you can then LIST the rest of the program. You will have to insert the essential commands back into the program later.

Most programs convert easily. Unfortunately, there is a class of programs, such as word processors, data bases and spread sheets, which cannot so easily be converted, because they require the saving and loading of files generated by the user, with variable names and addresses. These will be covered in detail in a subsequent article.

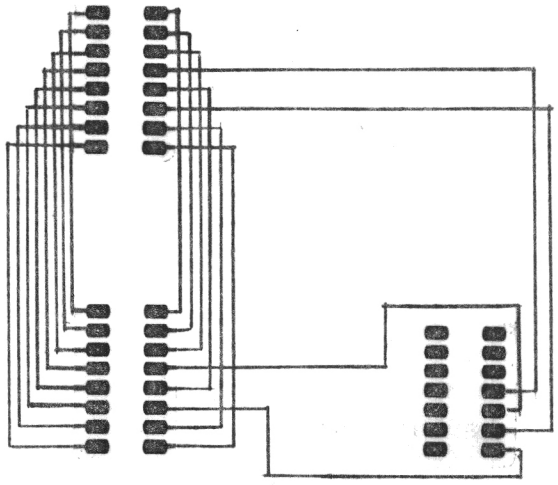
OVERALL PERFORMANCE

The disc interface performed extremely well. After such a long wait by many of us, it is a pleasure to finally operate with a computer which can speedily save and load programs without fuss, and with greater safety than with a tape system. Most programs will load within a second. The failure-to-load problem, so common with tapes, appears to be non existent with discs. The 2068 is now a truly convenient and powerful computer. Furthermore, the Aerco system will also configure discs to work with a Spectrum (although I didn't try that). Those who have Romswitches can use separate Spectrum discs for those programs. Further refinements of the system are promised, and probably we can expect these soon.

There are a few "glitches" and shortcomings. As with any disc system, it is possible to inadvertently erase or physically damage discs. (But I think that erasing is much less likely than with tape.) It is best to make a backup copy each time you put a new program on a disc. I advise putting a lock-write tape on each backup and each filled disc. MERGE from disc and the three extensions mentioned above are not yet available. Occasionally, the disc operating system will deactivate, but this can be remedied with OUT 244,1. The Timex cartridges, which are pluged into the front of the 2068, will not work with the Aerco system installed. Conceivably, a person could install an on-off switch on the Aerco unit to solve that problem. If a cartridge program were copied onto a disc, with an .ARO extension, it would load into the dock in about one second, and run just like the cartridge program, thus alleviating that problem. I've seen "Crazybugs" run that way, and it works fine, but I don't yet know the details of how to transfer the program. Finally, a minor cosmetic complaint, the interface board does stick up some 2 1/2 inches above the level of the 2068.

The people at Aerco are extremely helpful to customers who have some problem with their disc systems. If you do have troubles, I recommend a quick call. All things considered, the overall assessment has to be that this is an excellent unit which significantly enhances the 2068 system.

Original Socket
for 74LS367AN
(or header)



Sync Inverting Circuit for Aerco 2068
Disc Interface RGB Circuit

[INSERT A]